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URINE-SAMPLING APPARATUS FOR THE "TWO-GLASS" TEST IN THE RECOGNITION OF URETHRITIS IN WOMEN*

BY

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The development of urinary symptoms is said to be one of the commonest reasons for women seeking medical advice (Fry, Dillane, Joiner, and Williams, 1962) and since diagnosis in general practice by history alone is said to be the rule rather than the exception (Eastwood, Bruce, and Wren, 1965) it seems likely that in this field of medicine there are numerous opportunities for error, particularly in these two aspects, whether or not the symptoms have an organic basis and whether or not the disease is confined to the urethra. The usual method for recognizing urethritis in females is inspection of the external urinary meatus combined with examination of a stained smear of material removed from the urethra by means of a platinum loop. The value of this latter procedure is open to question, since the quantity of inflammatory cells seen on the slide will vary with the nature of the material which has adhered to the loop and also with the thickness of the smear. What appeared to be an improved method of diagnosis has recently been reported by Moore, Hira, and Stirland (1965). These workers described the application of what is essentially the two-glass test for male urethritis to cases in females, with the addition that counts of inflammatory cells were performed on the first 50 ml. of urine and also on a second 50 ml. sample passed later during the same act of micturition. Although a sample of this size is a convenient volume from the point of view of control of voiding, collection, and subsequent handling, it would seem on theoretical grounds, when considering the matter of cell counts, to be too large and likely to lead to inaccuracies. In the time-honoured practice of the two-glass test for urethritis in men, a volume of 50 ml. (about 3 in. in the usual conical glass) has been generally accepted as a sufficient quantity to cleanse the anterior urethra of the majority of pus so that any which remains is of too small a quantity to be detected macroscopically when clear urine from the bladder is passed into the second glass. If the same empirical considerations on which this test in males is based are applicable in female cases, it is likely that a much smaller sample would be suitable, since the volume of the female urethra is about one quarter of that of the anterior urethra in the male. During micturition the female urethra is distended to form a cylinder of average dimensions 4 cm. long by 0·5 cm. diameter, the volume of urine contained being of the order of 1 ml. The use of a 50 ml. sample as advocated by Moore and others (1965) would appear to lead to very considerable dilution of the urethral washings with a consequent risk of failure to recognize minor degrees of urethritis. It is therefore suggested that the volume of the first urine in the two-glass test in females should be in the region of 10–15 ml. As well as a sample of suitable size there must be, as advocated by Moore and others, meticulous cleaning and drying of the external genitalia. It is also recommended that the vaginal orifice should be occluded with a ball of cotton wool of appropriate diameter to prevent material being expressed from the vagina during straining to initiate micturition.

Apparatus

In the accurate collection of a small quantity of urine from female patients, some type of automatic sampling device is desirable. Fig. 1 (overleaf) shows such an apparatus which has been devised by the author for isolating the first and last 15 ml. of voided urine. It consists essentially of a U-tube with a built-in airlock. The dilatations at "A" ensure that air is trapped in the loop at "B", thus isolating the first 15 ml. from the subsequent flow which follows the by-pass "C". The last 15 ml. is contained in "D". The remainder of the urine goes into the measuring cylinder. The apparatus has been made of pyrex

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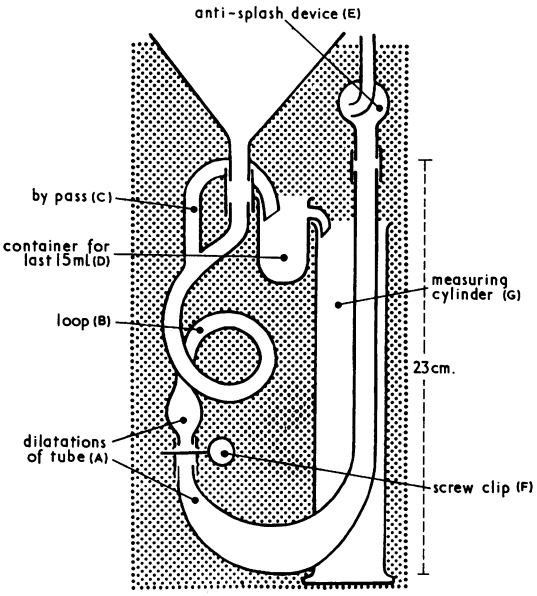

FIG. 1.—Diagram of urine sampler.

glass so that it can be autoclaved. It was tested with dye representing urethral washings, followed by water, representing pus-free urine from the bladder, and it was shown by photo-electric measurements that all the dye went into the U-tube beyond the airlock and remained unaffected by the flow of the rest of the water.

Trial

Using this apparatus with precautions to avoid contamination, a preliminary trial was carried out on twenty consecutive patients seen in general practice, all of whom were complaining of urinary symptoms at the time of examination; in all cases the patients had held water for not less than 2 hours before the samples were collected. Cell counts on the samples were carried out in a Fuchs-Rosenthal counting chamber.

Results

The Table shows the results of cell counts on the first specimen of voided urine from each of the twenty patients, arranged in order of the magnitude of the count. It will be seen that among the ten patients with the lowest cell counts only fifteen cells in all were counted, an average of 1·5 cells in the 3·2 cu. mm. of the counting chamber. Culture of these specimens in all cases yielded either an insignificant growth of organisms or none at all. Thus half of a group of twenty women with urinary symptoms were found to have no objective evidence of urinary infection and it seems significant that when these ten women later underwent psychiatric investigation anxiety neurosis was diagnosed in each case.

TABLE

PUS CELL COUNTS
ON FIRST 10 ML. URINE FROM URINE SAMPLER

Twenty consecutive cases each presenting with urinary symptoms are arranged in order of size of cell count.

Number of Pus Cells in 3·2 cu. mm.	Number of Pus Cells per ml.
12,680	3,964,000
8,160	2,551,000
2,146	670,700
2,120	662,500
1,850	578,200
619	193,500
441	137,800
142	44,380
85	26,570
27	8,439
3	938
3	938
2	625
2	625
1	313
1	313
1	313
1	313
1	313
0	0

The patient whose urine yielded the lowest of the abnormal cell counts was a woman who had been catheterized at delivery 8 weeks previously and was complaining of burning and urgency of micturition; there were no complaints of frequency. The first specimen of urine contained 8,439 cells per ml. but no cells were found in the 3·2 cu. mm. of the end specimen; cultures of each specimen yielded no growth. Thus urethritis was present and there was no evidence suggesting inflammation higher in the urinary tract. The patient's symptoms disappeared without treatment 2 days after examination. Such a case might well have been dealt with by a prolonged course of an antibiotic had diagnosis depended only on the history.

Comment

A further advantage of the use of this apparatus is that it seems to provide a clear-cut distinction between the normal and abnormal, as shown in Fig. 2 in which the seven borderline results outlined in the Table are plotted to illustrate the obvious gap between the highest normal count and the lowest abnormal count. In cases of urethritis the number of inflammatory cells contained within the urethra before voiding can be obtained by multiplying the number of millilitres in the first glass by the difference in cell counts between the first and last specimens. It is recommended that this figure be used as a measure of the degree of urethritis present, as it will avoid any inaccuracies that could arise from small variations in size, and thus of dilution, of the first glass sample. Moreover, a quantitative measurement of this type leaves little room for observer bias in assessing results of treatment.

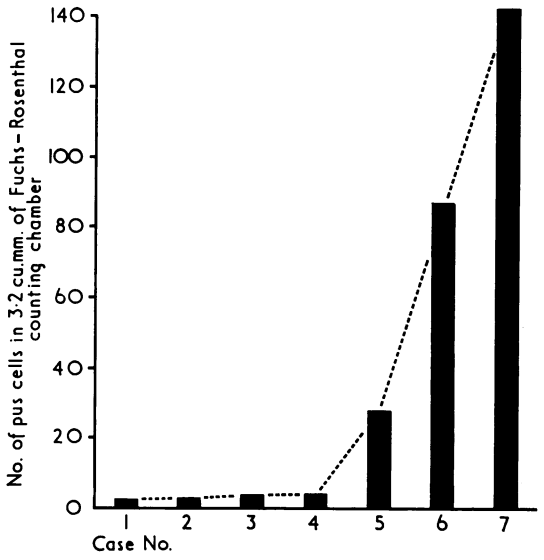

FIG. 2.—Seven borderline cases included in rectangle in Table plotted in graphic form. Note clear-cut difference between highest normal and lowest abnormal counts.

Summary

In an attempt to improve methods of recognizing urethritis in females and of distinguishing urethritis from inflammation higher in the urinary tract, a urine-sampling device has been constructed to facilitate the carrying out of an improved two-glass test involving cell counts of the first and last specimens. Findings in a preliminary trial are described.

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Un appareil pour l'échantillonage d'urine pour améliorer le test de "deux éprouvettes" afin de reconnaître l'urétrite chez la femme

RÉSUMÉ

Dans un essai d'améliorer les méthodes de reconnaître l'urétrite chez la femme et de distinguer l'urétrite de l'inflammation de la partie haute des voies urinaires, un appareil pour prendre un échantillon d'urine a été construit afin de faciliter une amélioration de "deux éprouvettes" pour la numération des cellules dans le premier et le dernier échantillon. Les constatations d'un travail préliminaire sont décrites.